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Bio-paraffin mixtures production over different catalysts

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The hydrocarbons of bio-paraffin mixtures are mostly in diesel fuels (less in aviation fuels) boiling range; therefore they can be promising alternative fuel component. Moreover, the bio-paraffin mixture can be used in the cosmetics and pharmaceutical industry, food industry, in petrochemical industry, for example C_{14}-C_{18} paraffin hydrocarbons can play important role in detergent production (e.g. for lubricant or household detergents).The main production possibilities of bio-paraffins are the followings: integrated Fischer-Tropsch (F-T.) synthesis from biomass derived syngas, from lignocellulose through simple sugars, from bioethanol via dehydrogenation, oligomerization and saturation, from natural/waste triglycerides, from natural/waste fatty acids. The aim of our research was the investigation of (catalytic) hydrogenation of waste fatty acid mixture over different catalysts (sulphided or non-sulphided $CoMo/Al_2O_3$, $NiMo/Al_2O_3$, and Pt/Al-SBA-15 to valuable bio-paraffin for JET/diesel fuel blending components, petrochemicals or other valuable products).We investigated the effects of catalytic system (reactor, catalyst properties, process parameters – temperature: 250-350 °C, pressure: 40 bar, liquid hourly space velocity: 1,0-3,0 h^{-1}, hydrogen/feedstock volume ratio: 450 Nm^3/m^3) on the yield and quality (e.g. chain length, isoparaffin content, content of non-paraffinic components) of the paraffin mixture and they applicability.We carried out the catalytic (hydrogenation) experiments in a (pilot scale) high-pressure reactor system, which contained a tubular down flow reactor with 100 cm^3 effective volume and all the equipment and devices applied in the reactor of an industrial hydrotreating plant.The properties of the feedstocks and the products were determined by standardized methods and they composition with gas chromatographic method, respectively.Based on the obtained results, all the catalysts are suitable for production of bioparaffins from waste fatty acids. Yields of main products changed in function of catalyst compositions (sulphided $NiMO/Al_2O_3$> sulphided $CoMo/Al_2O_3$) > non-sulphided $NiMo/Al_2O_3$ ≥ non-sulphided $CoMo/Al_2O_3$> Pt/Al-SBA-15). The paraffin mixtures with relatively high isoparaffin content were obtained over non-sulphided $CoMo/Al_2O_3$ and Pt/Al-SBA-15 catalysts.

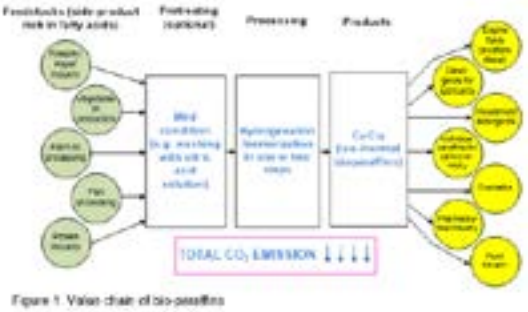

Figure 1: Value chain of bio-paraffins

Recent Publications

1. BP (2018) Statistical Review of World Energy 2018. (accessed: 13. june 2018.), www.bp.com
2. Coumans AE, Hensen EJM (2017) A model compound (methyl oleate, oleic acid, triolein) study of tri-glycerides hydrodeoxygenation over alumina-supported NiMo sulphide. Applied Catalysis B: Environmental 201: 290–301
3. Hengst K, Arend M, Pfützenreuter R, Hoelderich WF (2015) Deoxygenation and cracking of free fatty acids over acidic catalysts by single step conversion for the production of diesel fuel and fuel blends. Applied Catalysis B: Environmental 174: 383-394.
4. Szarvas T, Eller Z, Kasza T, Ollár T, Tétényi P, Hancsók J (2015) Radioisotopic investigation of the oleic acid-1-14C HDO reaction pathways on sulfided Mo/P/Al_2O_3 and NiW/Al_2O_3 catalysts. Applied Catalysis B: Environmental 165: 245-252.
5. Oh YK, Hwang KR, Kim C, Kim JR, Lee JS (2018) Recent developments and key barriers to advanced biofuels: A short review. Bioresource technology 257: 320-333.
6. Sheldon RA (2014) Green and sustainable manufacture of chemicals from biomass: state of the art. Green Chemistry 16(3): 950-963.

Biography

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